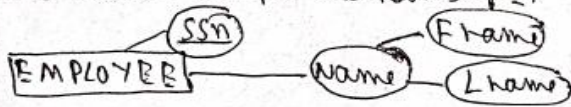


Step 1:- for each regular (strong) entity type E in the ER schema, create a relation R that includes all the simple attributes of E.



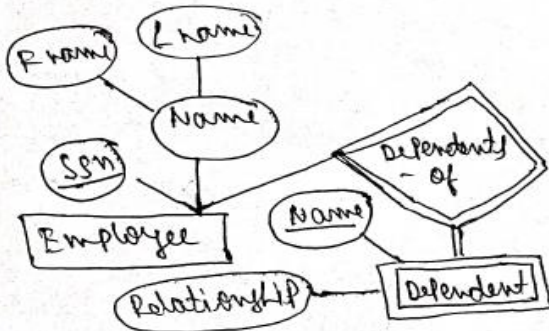
EMPLOYEE

SSN	Lname	Fname
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② Mapping of regular Entity types

② Mapping of weak entity type

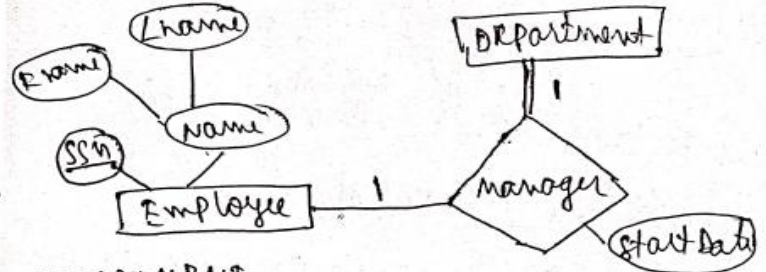
for weak entity W in ER schema with owner entity type E, create a relation R and include all simple attributes (or simple components of composite attributes) of W as attributes. In addition, includes as foreign key attributes of R the primary key attribute(s) of the relation(s) that correspond to the owner entity type(s).



DEPENDENT

Empl-SSN	Name	Relationship
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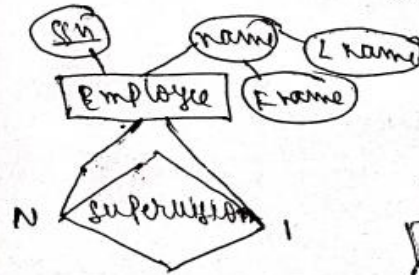
③ Mapping of Binary 1:1 Relation types
for each binary 1:1 relationship type R in the ER schema, identify the relations S and T that correspond to the entity types participating in R. choose one of the relations, say S, and include the primary key of T as a foreign key in S. include all the simple attributes of R as attributes of S.



DEPARTMENT

manager-SSN	start date
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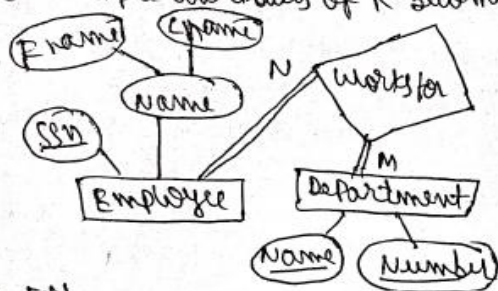
④ for each regular binary 1:N relationship type R identify the relation(s) relation S. the primary key of T as a foreign key of S. simple attributes of R map to attributes of S.



EMPLOYEE

supervisor SSN

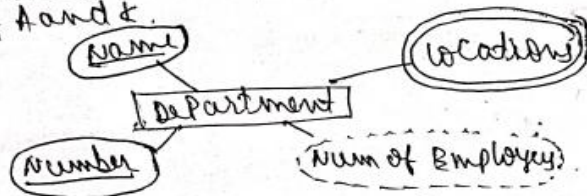
- ⑤ for each binary M:N relationship type R, create a relation S. Include the primary keys of participant relations as foreign keys in S. This combination will be the primary key for S. Simple attributes of R become attributes of S.



WORKS-FOR

Employee SSN / Dept Number

- ⑥ for each multi-valued attribute A create a new relation R. This relation will include an attribute corresponding to A, plus the primary key K of the parent relation (entity type or relationship type) as a foreign key in R. The primary key of R is the combination of A and K.



Dep-Location

Location / Dep-Number

- ⑦ for each n-ary relationship type R, where $n > 2$, create a new relation S to represent R. Include the primary keys of the relations participating in R as foreign keys in S. Simple attributes of R map to attributes of S. The primary key of S is a combination of all the foreign keys that represent the participants that have cardinality constraint > 1 . For a recursive relationship, we will need a new relation

consider database reserves (sid, bid, day)

sailors (sid, sname, age) boats (bid, bname, color)

- ① Find name of sailors who have reserved boat number 103

AS $(\Pi_{sname} (\sigma_{bid=103} Reserves) \bowtie Sailors)$

- ② Find the name of sailors who have reserved red boat

AS $(\Pi_{sname} (\sigma_{color='red'} Boats) \bowtie Reserves \bowtie Sailors)$

- ③ Find the id of sailors with age over 20 who have not reserved red boat

AS $(\Pi_{sid} (\sigma_{age > 20} Sailors) - \Pi_{sid} (\sigma_{color='red'} Boats) \bowtie Reserves)$

- ④ Find the name of sailors who have reserved at least one boat

AS $(\Pi_{sname} (Sailors \bowtie Reserves))$